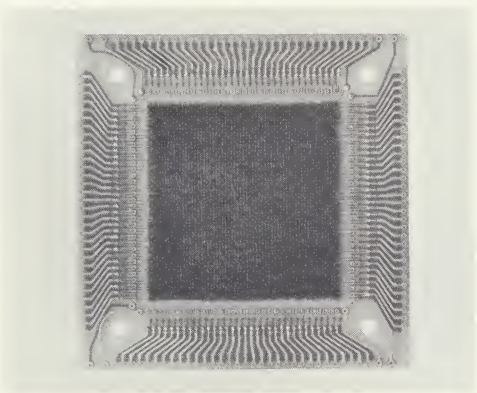
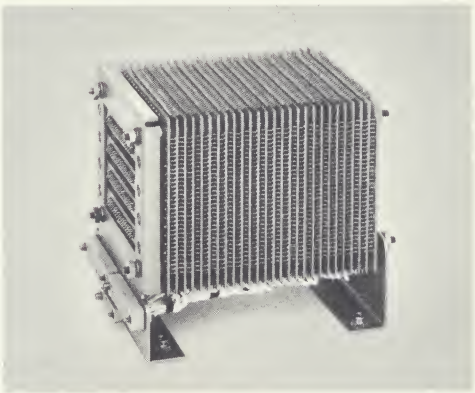


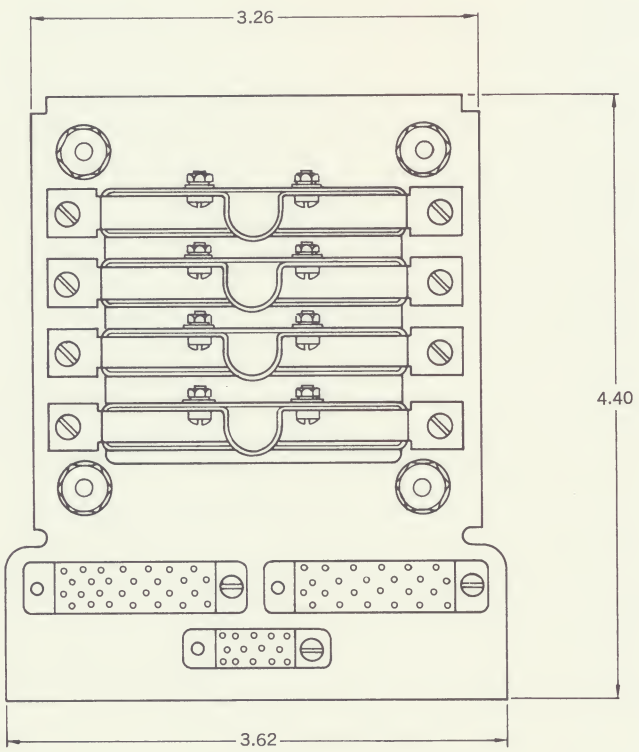


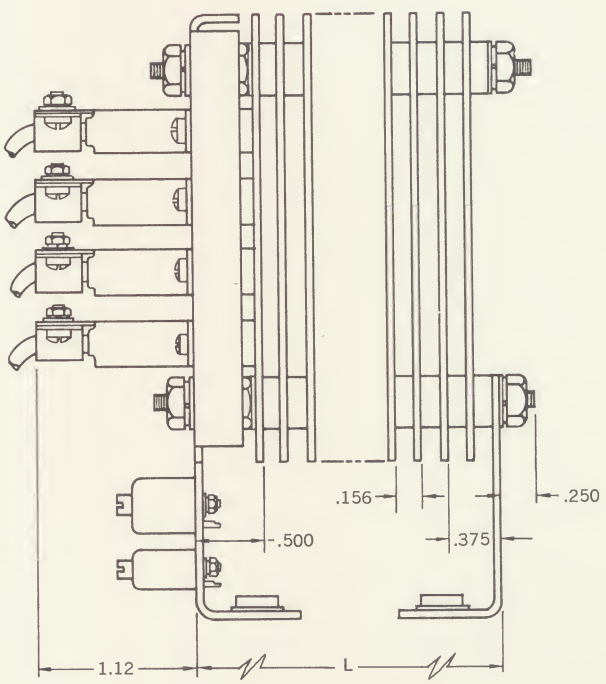
EMI's 30-mil, 4096-word core memory stacks have a cycle time capability of 1.5 microseconds in coincident current applications.

They cost no more than comparable 50-mil stacks, because of new assembly techniques.

A wide variety of bit sizes allows you maximum flexibility in design. See for yourself by using the stack length formula below.

L = LENGTH OF STACK
N = NUMBER OF FRAMES
.156 = WIDTH OF ARRAY FRAME WITH SPACER
.500 = WIDTH OF TIE PLATE AND CONNECTORS
.375 = WIDTH OF COMMON PLATE AND SPACERS
$L = (N \times .156) + .500 + .375$





GENERAL DESCRIPTION — 4096 WORD STACK

Wiring:	All matrix wires are 40 AWG polythermaleze wire. Inhibit windings and X lines are parallel. Sense lines are wound in a quadrature configuration. Sense windings utilize twisted pairs as the connection to their terminal pads.
Terminations:	Drive lines, sense lines and digit lines all terminate in plug-in connectors. Drive lines are bussed on both X and Y for an 8 x 8 driver-sink decode scheme.
Mounting Hardware:	All stacks can be supplied with mounting brackets for easy installation into your memory system. If mounting brackets and standard terminating connectors are not required, stacks can be supplied utilizing the stacking rods as the mounting points. All arrays are stacked using 6-32 rods, and spacers on 2.46″ centers.
Matrix Frames:	All arrays are strung on glass epoxy frames. The frames are available in open or solid configurations. Solid frame arrays can be coated to make high reliability stacks, which will meet shock and vibration requirements for ground based and shipboard applications. Frames with double sided mats are available for critical height applications.
Worst Pattern:	Sense winding geometry gives the following worst pattern:

	Y_0	Y_1	Y_2	Y_3	Y_4
X_0	0	0	1	1	0/
X_1	1	1	0	0/	
X_2	1	1	0/		
X_3	0	0/			
X_4	0/				

TYPICAL VALUES FOR ELECTRICAL CHARACTERISTICS

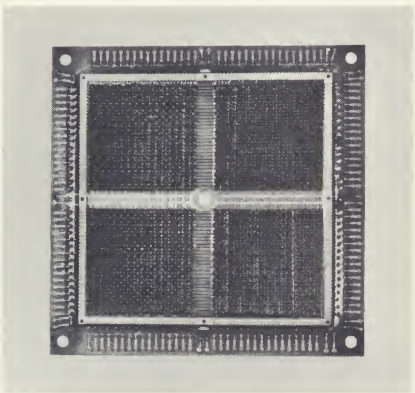
Resistance of X & Y Drive Lines	0.25 Ω / bit.
Inductance of X & Y Drive Lines	0.2 microhenries/ bit.
Resistance of Digit Line	12 Ω
Inductance of Digit Line	11 microhenries.
Resistance of Sense Line	18 Ω
Recommended Sense Line Termination	220 ohms.

AVAILABLE STANDARD CORES

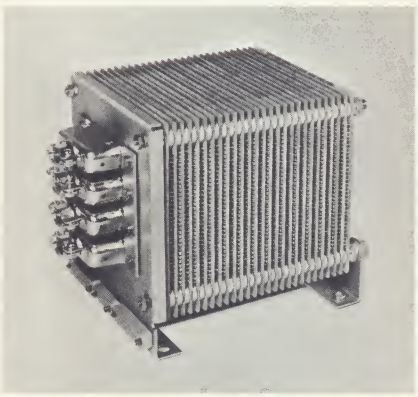
Core Type	Recommended Drive				Typical Matrix Outputs			
	Full Read/ Write	Digit	Rise Time	Pulse Width	dV_1	Min S/N at t_p	t_p	t_s
31-100	500 ma	225 ma	0.1μs	0.6μs	40 mv	4:1	.17μs	0.37μs
31-103	580 ma	260 ma	0.1μs	0.6μs	39 mv	5:1	.24μs	0.38μs
31-108	720 ma	325 ma	0.1μs	0.6μs	41 mv	5:1	.21μs	0.39μs

MEMORY PRODUCTS

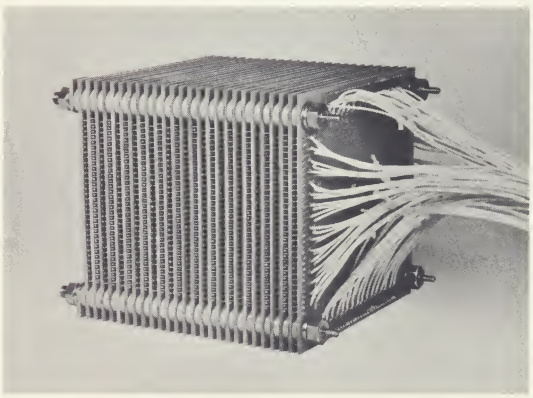
Industrial — Commercial — Military — Aerospace



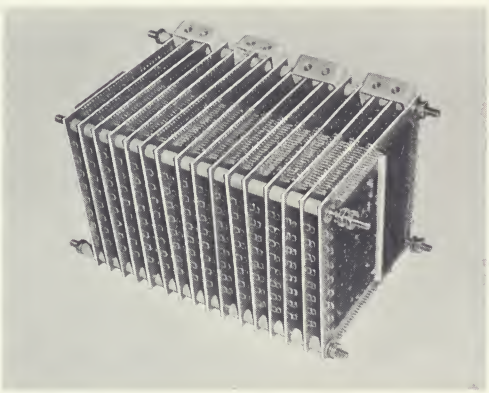
NDRO array



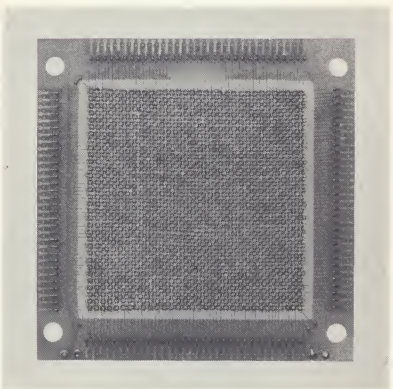
50 mil stack



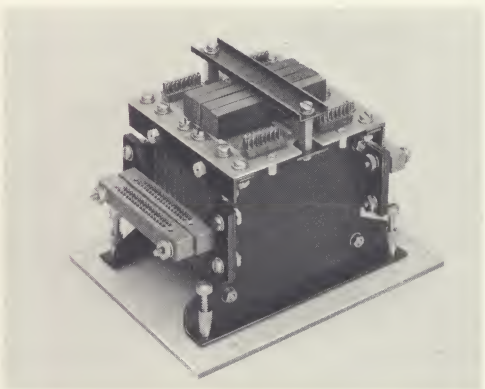
Commercial stack



NDRO stack



50 mil array



Military airborne stack

electronic memories inc.

12621 Chadron Avenue, Hawthorne, California

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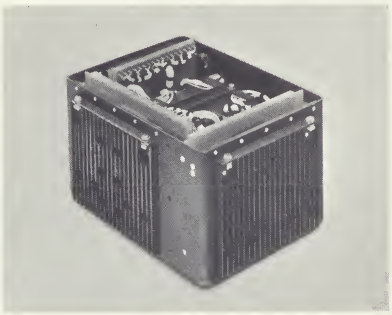
CONCEPT

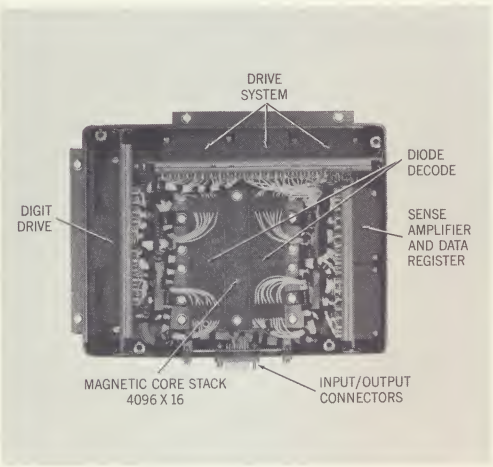
For the first time: A miniature, severe environment, random access, core memory system that combines the fastest speed yet found for military applications, with the versatility of a wide selection of word and bit sizes. That's EMI's new SEMS-1R.

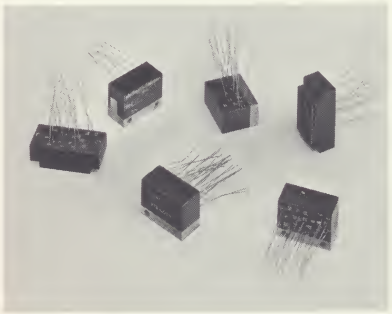
Designed to provide a militarized, high reliability package, while offering economical, random access operation over a wide temperature range, the SEMS-1R utilizes EMI's standardized "Isodrive" memory cores (see page 4), which maintain constant output signals at —55°C to +100°C.

You have a choice of two high reliability package configurations:

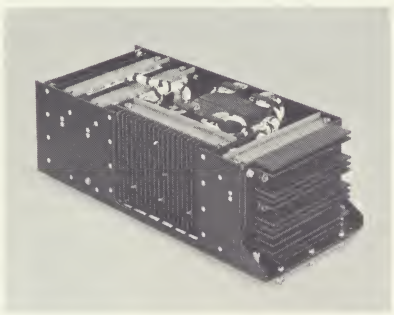
Welded Package: Utilizes encapsulated, welded modules and welded module interconnections for low weight and volume and a high order of reliability.

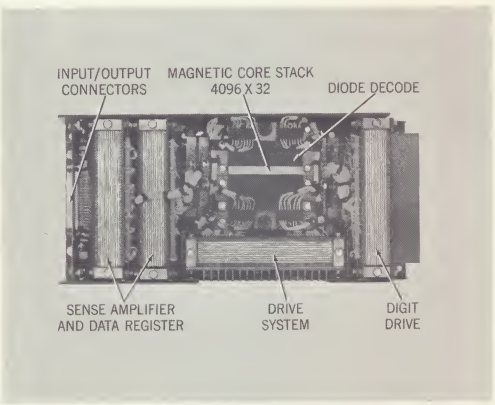


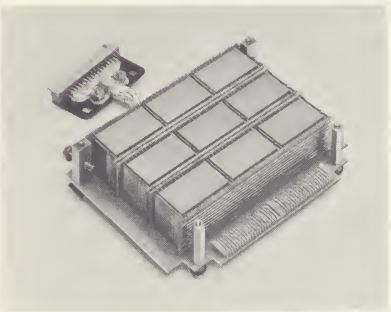




Pluggable-Welded Package: Made up of encapsulated, welded modules incorporating plug-in, cordwood construction for simplified maintenance at the module level.



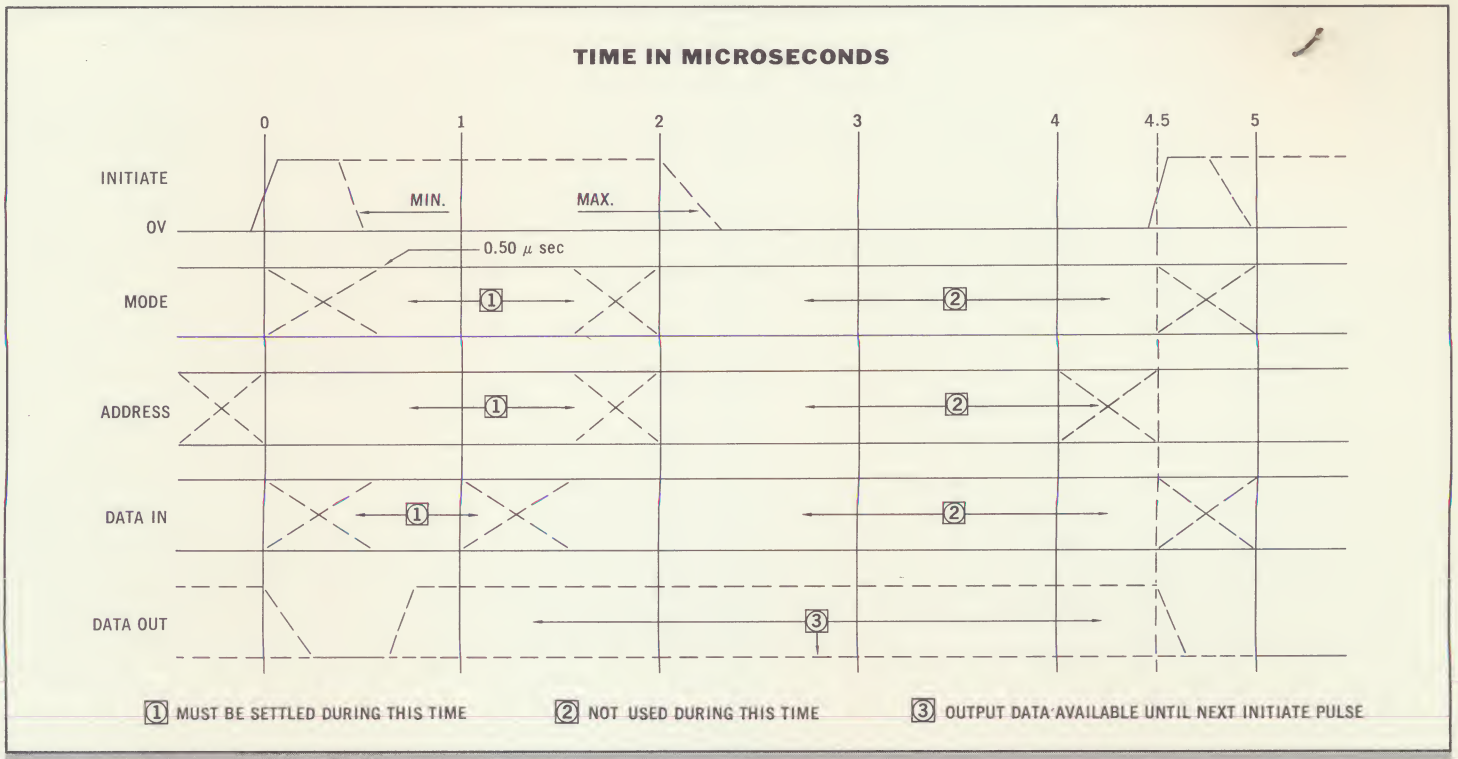


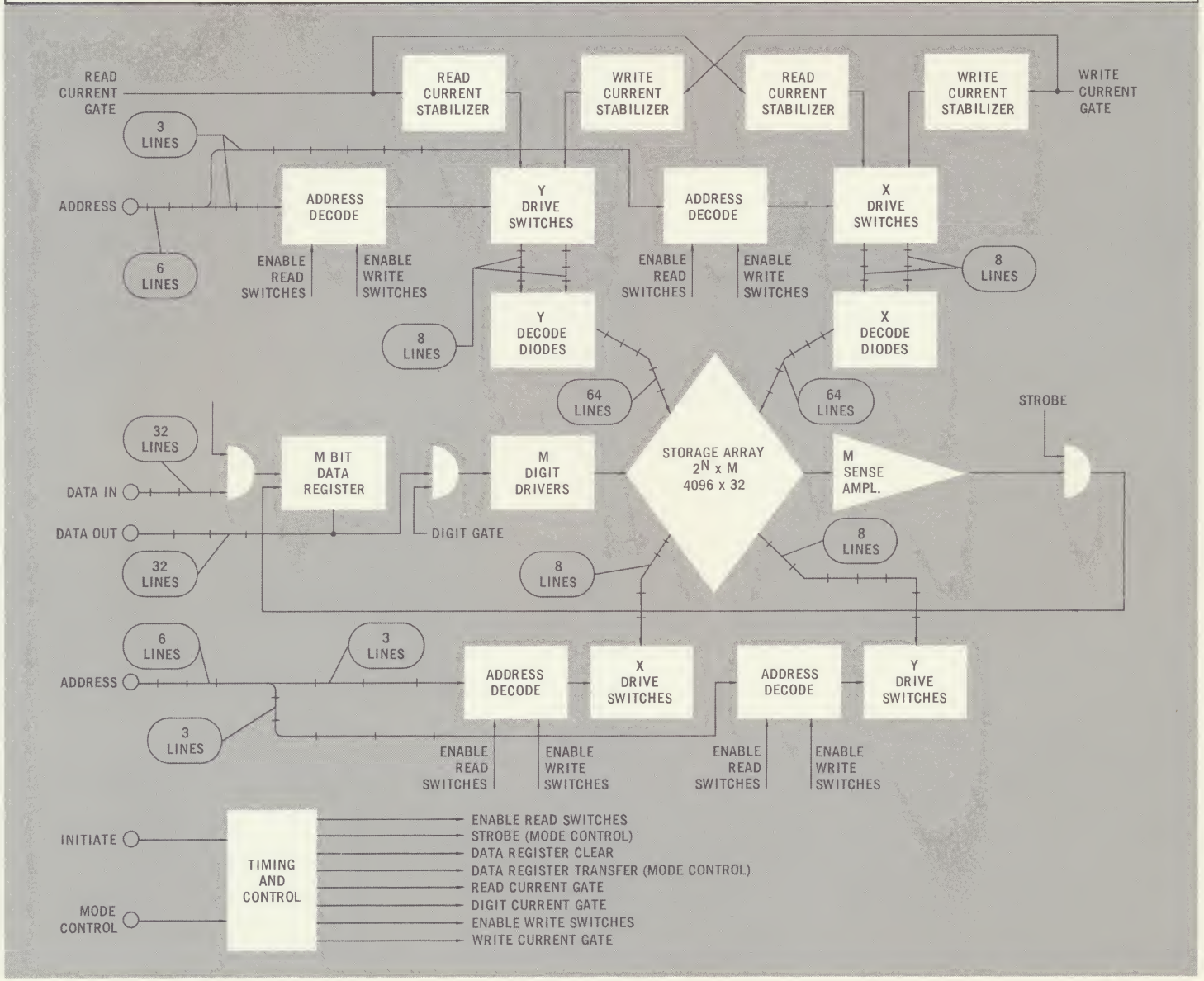


Another plus for SEMS-1R reliability is in the construction of the arrays within the memory unit. Continuous wiring connects all cores and arrays together. There are no soldered, welded, or plugged terminals between memory bits. Once the arrays are strung together, they are simply folded and assembled into a rugged package.

Both are designed to meet the Mil-Spec requirements for ground based, shipboard and airborne applications, where the following factors are of prime importance:

High reliability
Low weight and volume
Minimum power
High speed


TIME IN MICROSECONDS
0
1
2
3
4
4.5
5
INITIATE
0V
MIN.
MAX.
0.50 μ sec
MODE
ADDRESS
DATA IN
DATA OUT
1 MUST BE SETTLED DURING THIS TIME
2 NOT USED DURING THIS TIME
3 OUTPUT DATA AVAILABLE UNTIL NEXT INITIATE PULSE


READ CURRENT GATE
READ CURRENT STABILIZER
WRITE CURRENT STABILIZER
READ CURRENT STABILIZER
WRITE CURRENT STABILIZER
WRITE CURRENT GATE
3 LINES
ADDRESS
ADDRESS DECODE
Y DRIVE SWITCHES
ADDRESS DECODE
X DRIVE SWITCHES
6 LINES
ENABLE READ SWITCHES
ENABLE WRITE SWITCHES
ENABLE READ SWITCHES
ENABLE WRITE SWITCHES
8 LINES
8 LINES
Y DECODE DIODES
X DECODE DIODES
64 LINES
64 LINES
STROBE
32 LINES
M BIT DATA REGISTER
M DIGIT DRIVERS
STORAGE ARRAY 2^N x M 4096 x 32
M SENSE AMPL.
DATA IN
DATA OUT
DIGIT GATE
32 LINES
8 LINES
8 LINES
6 LINES
3 LINES
ADDRESS
ADDRESS DECODE
X DRIVE SWITCHES
ADDRESS DECODE
Y DRIVE SWITCHES
3 LINES
ENABLE READ SWITCHES
ENABLE WRITE SWITCHES
ENABLE READ SWITCHES
ENABLE WRITE SWITCHES
INITIATE
MODE CONTROL
TIMING AND CONTROL
ENABLE READ SWITCHES
STROBE (MODE CONTROL)
DATA REGISTER CLEAR
DATA REGISTER TRANSFER (MODE CONTROL)
READ CURRENT GATE
DIGIT CURRENT GATE
ENABLE WRITE SWITCHES
WRITE CURRENT GATE

SPECIFICATIONS

Storage Capacity[1]	256, 512, 1024, 2048, or 4096 words by 4 to 32 bits (in 2 bit increments).
Operating Temperature	−55°C to +100°C
Storage Temperature	−65°C to +125°C
Altitude	70,000 ft.; or higher at slightly reduced upper temperature limits.
Read/Restore Cycle Time	4.5 μsec.
Clear/Write Cycle Time	4.5 μsec.
Access Time	Less than 1.0 μsec.
Operating Rate	0 to 220 kc
Input Signal Levels	Binary 0 = 0 to 0.5 V Binary 1 = +4 V to +7 V
Output Signal Levels	Binary 0 = 0 to 0.25 V Binary 1 = +5 V to +6.5 V
Input Currents	
A. Address	3 ma. max. for 1.5 μsec. if line is in + state; 0 ma if line in 0 state.
B. Mode Control	0.4 ma in 0 state (CLEAR/WRITE), 0 ma when in + state (READ/RESTORE).
C. Information	0 level — no current required. ± level — less than 1.0 ma.
D. Initiate	0 level — no current required. + level — less than 1.0 ma.
E. Edge Current	In addition to the logic current required, approximately 9.0 ma of edge current must be supplied to charge a capacity of approximately 200 μμf to effect a change from one logic level to another level within 100 nanoseconds.
Output Current Information Lines	0 level — 0 current + level — 5.0 ma.

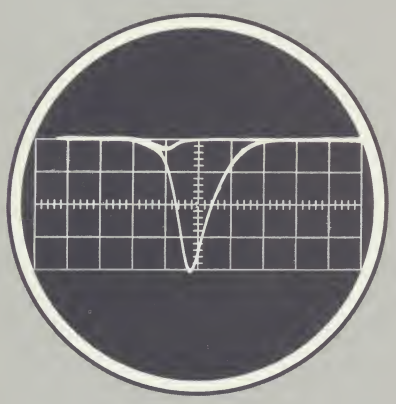
Input Signal Characteristics	Rise Time (μsec.)	Width (μsec.)
A. Address	.1	1.5 min.
B. Initiate	.1	0.2 to 2.0
C. Information Lines	.1	1.0 min.
D. Mode Control	level	level
Output Signal Characteristics		
Information	.1	2.0 min.

Power Req'mt (4096 x 32)	35 watts for 4.5 microsecond cycle time.
Voltages Required[2]	+15, +6, −3
Volume (4096 x 32)[2]	Without power supply — 330 cubic in. for pluggable-welded package.[3]
Weight (4096 x 32)	Without power supply — 12 lbs.
Form Factor (4096 x 32)[2]	Length 12¾″; width 5⅞″; height 4½″.[3]
Applicable Mil Specs	MIL-E-5400, MIL 16400E, MIL 4158B, MIL-Q-9858
Vibration and Shock	Per applicable mil-spec.
Types of Packaging	Pluggable welded modules; or, welded modules with welded interconnections.

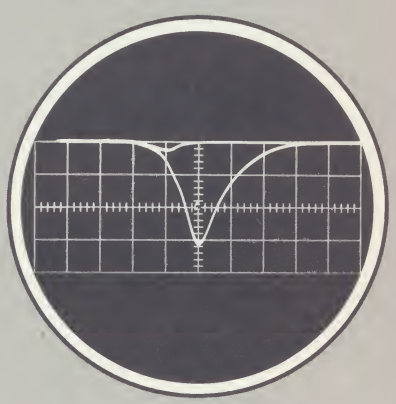
1. Larger word and bit sizes available to meet special requirements.
2. Power supply optional — if required, add additional 125 cu. in.
3. Smaller packaging available for special requirements.

ISODRIVE CORE

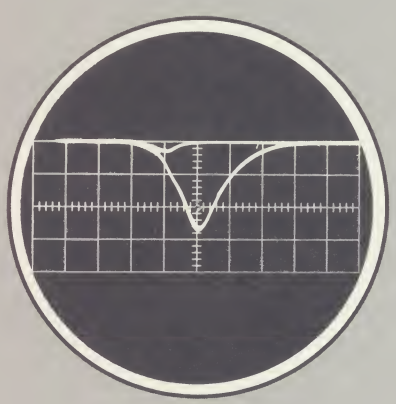
Comparative output wave forms



+100° C
Actual test oscillogram with core immersed in boiling water



+25° C ROOM TEMP.



−55° C
Actual test oscillogram, core in dry ice and alcohol.

FEATURES

Fast switching, high drive, high output. Improved disturb ratio allowing increased tolerance to drive current drift. Increased signal-to-noise ratio at sampling time. Excellent characteristics over −55°C to +100°C operating range without current compensating circuits.

RECOMMENDED OPERATING CONDITIONS

Temperature	−55°C to +100°C
Drive Pulse ($I_r = I_w$)	700/350 ma turns
Pulse Width (t_w)	1.0 μs
Pulse Rise Time (t_r)	.2 μs ± .02 μs linear
Pulse Fall Time (T_f)	0.2 μs min.

TYPICAL OUTPUT SIGNALS

Temperature:	−55°C	+25°C	+100°C
Switching time (ts)	0.62 μs	0.58 μs	0.63 μs
Peaking time (tp)	0.36 μs	0.34 μs	0.30 μs
Amplitude ONE (uV1)	44 mv	48 mv	68 mv
Amplitude ZERO (dVz)	4 mv	5 mv	5 mv

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